point of view of efficiency. "An efficient process is one in which the available results exceed the expenditure." (p. 4); and the work is an attempt to analyse the various forms and sources of efficiency into a few elemental principles. "While the book has been cast in a form adapted to general reading, groups of exercises have been inserted which, it is hoped, will add to its value if it is used as a text-book in any institution where the principles of efficiency are taught."

Surely it is only in America that we could have a professor of efficiency. From the preface we also learn that, since the importance of investigating the elements which constitute fitness, that is, efficiency, becomes evident as soon as the principle of the survival of the fittest is recognised, the leading ideas of the book were suggested by the reading of Herbert Spencer. Many important details have been obtained from the publications of the Efficiency Society and the works of various modern writers.

The most primitive and, in a sense, fundamental source of efficiency is the act of re-use or repetition, and human progress in general is marked by an increasing amount and by higher forms of re-use (p. 31). A superior efficiency to more or less haphazard re-use is attained by the "unit and multiplier principle" treated in chapter iii.: "A *unit* is any entity used manifoldly in space or time or in any relation. The *multiplier* expresses the number of manifold uses made of a unit" (p. 50). This principle may be extended so as to form a still more general agent of efficiency, that of the "group," and this is dealt with in chapter iv. The group is so fundamental in its nature that the other primal sources of efficiency may be regarded as various methods of using the group. Groups may be used not only singly, but also in combination, with a corresponding increase of efficiency (chapter v.). It is often a source of efficiency to substitute for a given system of groups a series of groups or "orders" of the system (chapter vi.). The use of an object or objects external to a given domain as a means of obtaining results by forming new and large groups is the source investigated in chapter vii.

Chapter viii. deals with sources obtained by the perceptions of diversities and of uniformities. After a study (chapter ix.) of the aims and ends of efficiency processes, chapter x. contains a good treatment of symbolism as an agent of efficiency, and here pp. 174–175, 177, 185, 187 (*cf.* p. 359) seem especially noteworthy. The other chapters are on the principle of directive action, the study of speed and rhythmic methods as means to efficiency, the principle of "dialectic" or unexpected discovery, the study of limitations of processes, the removal of waste and error, and the combinations of efficients. Chapter xviii. deals with applications to psychology, education, sociology, business, art, ethics, and religion. Finally, there are appendices on "The Categories and a General Philosophy of Life" and a "Historical Survey."

The book is rather obscurely written, but contains very much valuable illustrative material.

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OUR BOOKSHELF.

Elementary Human Biology. By J. E. Peabody and Dr. A. E. Hunt. Pp. xii+194. (New York: The Macmillan Co.; London: Macmillan and Co., Ltd., 1915.) Price 4*s*.

UNDER this somewhat curious title the two authors, American schoolmasters, have produced a manual which deals with elementary hygiene. It is evidently written for children, for the pronunciation and derivation of comparatively simple words, such as involuntary and ventilation, are given. It, however, manifests a curious lack of perspective, for while it contains simple exercises which teach young pupils the reasons for rules of health, such as cleaning the teeth, masticating the food, and washing the skin, it also deals with elaborate details for comparing bacteriologically with Petri dishes the air of a room after sweeping it with a broom, and after the use of a vacuum cleaner. One home exercise which with unconscious humour is marked optional consists in chewing popped corn and noting that it becomes sweet during the process. The conditions of American life are so often different from those in this country, for instance, in the matters of heating and ventilating houses, that we doubt whether the present book will profitably replace the many excellent text-books on hygiene we already possess here; the same may be said in relation to subjects such as profitable housekeeping and cooking. Even if the English child or his parent overcomes the difficulty of converting dollars into shillings, we doubt whether they will be much enlightened by such words as skillet, round steak, and string beans.

A few of the many errors noted are: that milk-sugar is changed into grape-sugar by heating it with Fehling's solution; that the saliva forms dextrose from starch; that nerve impulses travel 100 ft. per second; that Nissl granules in nerve cells appear as a result of fatigue; that the epiglottis closes as a lid on the larynx during swallowing; that peptone is the end-product in digestive proteolysis; that Sylvester's method for artificial respiration is the best. Children, it is true, require teaching to be simple, but they deserve that it should be accurate. W. D. H.

Inorganic Plant Poisons and Stimulants. By Dr. W. E. Brenchley. Pp. ix+110. (Cambridge: At the University Press, 1914.) Price 5*s*. net.

MISS BRENCHLEY has set herself a difficult task in attempting to deal with problems such as are indicated in the somewhat ambitious title of her

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book, and we confess to a feeling akin to disappointment after a perusal of the volume. The work is good as far as it goes, but the treatment is less suggestive, and the grip less firm than we had been led to anticipate.

The effects of the salts of five elements, viz., copper, zinc, arsenic, boron, and manganese upon plant growth have been studied, and the surprisingly deleterious results which follow on the addition of minute traces of some of them to plants grown as water cultures are described, and are also illustrated by excellent photographs. The conclusion is reached that no stimulation of growth follows the addition of even the smallest amounts of salts of copper, zinc, or arsenic, whilst some improvement does occur when salts of boron or manganese are employed. This is of interest when the somewhat widespread notion of the beneficial action of traces of copper salts, in some instances, at any rate, is recalled. Naturally, however, one must accept with caution conclusions based on the results of water-culture experiments in any endeavour to extend them to plants growing under ordinary soil conditions. This is the more necessary when one reflects how differently plants may behave in pot culture and in the field, and that even in the field itself it is not possible always to predict results at all accurately when the soil, aspect, drainage, and other factors as well are all subject to variation. We need a far more intimate knowledge of the physical conditions, as well as of the chemical processes that are in part, and often largely, governed by those conditions in the soil, before we shall be in a position even to formulate these fundamental questions, a satisfactory answer to which must form the basis on which our real knowledge of the plant, in this connection, will have to be built up. Miss Brenchley is fully aware of the difficulties which surround the whole subject, and her summing up of the whole position is admirable in its caution.

Index to Periodicals. Compiled by various authorities and arranged by A. C. Piper. Vol. i., April—September, 1914. Pp. xxxii + 192. (London: Stanley Paul and Co., for *The Librarian and Book World.*) Price 21*s.* net.

THE general editor of this classified and annotated index to the original articles contained in some of the principal weekly, monthly, and quarterly periodicals, Mr. A. J. Philip, rather disarms criticism by recounting in the preface the difficulties due to the war under which the index has been prepared. The idea of such an index of the important signed articles in periodical literature was excellent, and had it been possible to carry it out with some completeness, the result would have been widely welcomed.

It is difficult to understand on what plan the 109 periodicals indexed have been chosen. The preface says that foreign periodicals have been omitted, yet the names of a few appear in the list of those indexed. The *Journals* of the Royal Anthropological Institute, the Royal Microscopical Society, the Royal Sanitary Institute, and the Royal Statistical Society have been dealt with, but the publications of the Royal Society, the Royal Astronomical Society, the Royal Meteorological Society, the Chemical Society, the various engineering institutions, and scores of others of equal importance are ignored. Similarly in education, attention is confined apparently to the *Educational Times,* the *Journal of Education,* and the *Parents' Review,* while no mention is made of the *Preparatory Schools Review,* the *School World,* the *Schoolmaster,* and a host of others. The *Classical Review* is indexed, but the periodicals concerned with modern languages, English studies, nature study, and so on, seem to have been forgotten.

While appreciating the enterprising beginning which has been made, it may be hoped that in the next volume the compilers will cast their nets more widely, and so secure a more representative production.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

The National Organisation of Scientific Effort.

FOR readers of NATURE one of the most striking features of the war is that the German Government should be approved and supported by its prominent men of science, in spite of the fact that it uses methods of warfare which we regard as being outside the pale of humanity and common civilisation. It seems inconceivable that anything like it should happen in this country. If the British military authorities had transgressed against the written and unwritten laws of humanity as Germany has done, we feel sure that our men of science would have found a voice in condemnation of the Government. In this country it is no unusual thing for men of science to find a voice in condemnation of the Government, both for what it does and for what it leaves undone. Such condemnation used, in fact, to be, in peace time, a staple article of scientific public-speaking, the like of which one did not find in Germany. One never heard there even in private conversation the kind of criticism of Government action or inaction which in this country is reiterated commonplace.

The difference in practice may be attributed to the fact that in Germany scientific effort is organised by Government, which stands to scientific work in the relation of creator, provider and guardian, on its own terms. In Germany, Government is the providence of science; and to rail against Government, even when its ways are dark and mysterious, is not to be thought of. The attitude of the man of science in Germany towards his Government recalls Cowper's hymn. Changing the grammatical gender to avoid irreverence:—

> Blind unbelief is sure to err
> And scan Its work in vain,
> It is Its own interpreter
> And It will make it plain.

We have nothing like it in this country, and this reflection prompts the question: What is the corresponding organisation in this country? For organisation there must be, whether it be simple or elaborate, effective or ineffective, intentional or haphazard.

Our organisation is, in fact, haphazard, a matter of history and tradition; and, on examination, it

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